Amendments to Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method for controlling a freeform layer-by-layer production apparatus, whereby a product is built up on a carrier layer by layer, out of a material to be added layer by layer, by means of a high energy beam guided with the help of a control data set, whereby the method comprises

loading a product target geometry data set, which represents the target geometry of the product to be produced; ~~and~~

~~generating the control data set on the basis of the product target geometry data set;~~

~~freeform sintering and/or freeform melting by means of the high energy beam in accordance with the control data set;~~

determining, before [[the]] any freeform sintering and/or freeform melting begins in connection with the product to be produced, a compensation data set and/or a compensation function to compensate for manufacturing-related effects caused by the sintering and/or melting, wherein deformations ~~resulting from stresses within the layers due to different thermal expansion of the layers and occurring~~ expected to occur after the product is released from the carrier resulting from stresses within the layers due to different thermal expansion of the layers are calculated and the compensation data set and/or compensation function is determined based on such calculated deformations; ~~and~~

~~wherein~~ generating the control data set ~~includes~~ by combining the compensation data set with and/or applying the compensation function to the product target geometry data set to generate the control data set; and

freeform sintering and/or freeform melting by means of the high energy beam in accordance with the control data set.

2. (Previously Presented) The method of claim 1, wherein the compensation data set and/or the compensation function is determined in dependence on a size and a shape of the product to be produced.

3. (Canceled)

4. (Previously Presented) The method of claim 18, further comprising using the compensation data set or the compensation function in dependence on the angle of inclination to reduce a thickness of the product to be produced, wherein the thickness is measured perpendicular to said tangential plane.

5. (Previously Presented) The method of claim 1, characterized in that the compensation function is continuous and differentiable.

6. (Previously Presented) The method of claim 5, characterized in that the compensation function contains a polynomial of 2^{nd}, 3^{rd}, 4^{th}, and/or higher degree.

7. (Previously Presented) The method of claim 6, further comprising:

using a plurality of compensation functions for a single product to be produced, wherein the plurality of compensation functions at least partially differ with respect to their degree.

8. (Previously Presented) The method of claim 7, wherein using a plurality of compensation functions includes using a polynomial of lower degree for simple-geometry regions of a product to be manufactured and using a higher degree polynomial for complex-geometry regions of a product to be produced.

9. (Previously Presented) The method of claim 1, wherein applying the compensation function to the product geometry data set includes applying the compensation function to the product geometry data set for only certain regions of the product to be produced.

10. (Previously Presented) The method of claim 9, wherein the compensation function is applied to the product geometry data set only for the connecting regions of a bridge to be produced as a dental prosthesis.

11. (Previously Presented) The method of claim 1, wherein the compensation data set and/or the compensation function are determined with the help of at least one parameter selected from a group of parameters consisting of:

- a modulus of elasticity of the material,
- a solidus temperature of the material,
- a thermal expansion coefficient of the material,
- a tensile strength of the material,
- an elastic yield point of the material,
- a processing chamber temperature that represents a temperature in a processing chamber surrounding the material to be processed,
- a processing temperature that represents a temperature of a region of the material irradiated by the beam,
- a layer thickness that represents a thickness of a material layer that has been or is to be applied,
- a power of the beam during sintering or melting,
- a traverse rate of the beam,
- an irradiation strategy,
- a geometry of the product to be produced,
- a height of the product to be produced, and
- a type of possible secondary treatment of the product after sintering or melting.

12. (Previously Presented) The method of claim 1, further comprising:

optically scanning, during or after irradiation of a material layer, a contour already created or being created of the product, wherein the optical scanning generates an optical scanning data set;

comparing the optical scanning data set to the product target geometry data set to detect a deviation; and

if a deviation is detected, correcting the control data set in accordance with the detected deviation.

13. (Canceled)

14. (Currently Amended) Apparatus for the production of metallic and/or non-metallic products by freeform sintering and/or freeform melting by means of a high-energy beam, whereby the apparatus comprises:

a high energy beam source for generating said beam,

a platform to hold a carrier and a material to be deposited in layers onto the carrier,

a control system for controlling the beam according to a control data set to guide the beam to build up a product from a material layer by layer, the control data set having been generated by calculating deformations that would result from stresses within the layers due to different thermal expansion of the layers expected to occur after the product is released from the carrier, determining the compensation data set and/or compensation function based on such calculated deformations, and combining [[a]] the compensation data set with and/or applying the compensation function to a product target geometry data set, wherein the compensation data set and/or the compensation function having been determined before any controlling of the beam in connection with the product to be built up. ~~to compensate for manufacturing-related effects caused by the freeform sintering and/or melting, wherein deformations resulting from stresses within the layers due to different thermal expansion of the layers and occurring after the product is released from the carrier are calculated and the compensation data set and/or compensation function is determined based on such calculated deformations.~~

15. (Previously Presented) The apparatus of claim 14, wherein the control data set has been generated so as to guide the beam to produce a dental product.

16. (Previously Presented) The apparatus of claim 14, wherein the high energy beam source generates a laser beam.

17. (Previously Presented) The apparatus of claim 14, wherein the high energy beam source generates an electron beam.

18. (Previously Presented) A method for controlling a freeform layer-by-layer production apparatus whereby a product is built up layer by layer, out of a material to be added layer by layer, by means of a high energy beam guided with the help of a control data set, whereby the method comprises:

loading a product target geometry data set, which represents the target geometry of the product to be produced;

~~generating the control data set on the basis of the product target geometry data set;~~

~~freeform sintering and/or freeform melting by means of the high energy beam in accordance with the control data set;~~

determining, before [[the]]any freeform sintering and/or freeform melting begins in connection with the product to be produced, a compensation data set and/or a compensation function to compensate for manufacturing-related melting into a region of a below layer when the layer being produced overhangs the below layer forming an angle of inclination of a plane placed tangentially to an exterior surface of the product relative to a horizontal plane, the compensation data set and/or the compensation function being determined in dependence on the angle of inclination; and

~~wherein~~ generating the control data set ~~includes~~ by combining the compensation data set with and/or applying the compensation function to the product target geometry data set to generate the control data set; and

freeform sintering and/or freeform melting by means of the high energy beam in accordance with the control data set.